WORKING DRAFT
BDCP HCP/NCCP Biological Goals and Objectives

Note: *This handout presents revisions to the working draft of the biological goals and objectives as developed by the Biological Goals and Objectives Working Group through November 20, 2008.*

Ecologically Hierarchical Organization of Biological Goals and Objectives

SAIC proposes to organize the biological goals and objectives hierarchically, on the basis of ecological scale, as follows:

1. Ecosystem Goals and Objectives
2. Natural Community Goals and Objectives
3. Species-Specific Goals and Objectives

The scope of each ecological scale is as follows:

- **Ecosystem Goals and Objectives.** Ecosystem goals and objectives are focused on improvements to the overall condition of hydrological, physical, chemical, and biological processes in the Delta in support of achieving goals and objectives for covered natural communities and covered species.

- **Natural Community Goals and Objectives.** Natural community goals and objectives are focused on maintaining or enhancing ecological functions and values of covered natural communities. Achieving natural community goals and objectives also serve to conserve the habitat of associated covered species and other native species.

- **Specific Goals and Objectives.** Species-specific goals and objectives address species-specific stressors and habitat needs that are not addressed under the higher order ecosystem and natural community goals and objectives and species-specific viability parameters as they relate to life stage occurrence of covered fish species in the Delta.

Ecosystem Goals and Objectives

Goal ECSY 1: Provide hydrodynamic conditions within Delta waterways that contribute to viable populations of covered fish species.

> **Objective ECSY1.1:** Provide hydrodynamic conditions that support the movement of larval and juvenile life stages of covered fish species to downstream rearing habitats.

*[**Note:** conservation measures that contribute towards achieving this objective will include quantitative metric values to be developed by the Conveyance Working Group.]*

Objective ECSY1.2: Provide hydrodynamic conditions that support the movement of adult life stages of covered fish species to upstream spawning habitats.

*[**Note:** conservation measures that contribute towards achieving this objective will include quantitative metric values to be developed by the Conveyance Working Group.]*

Objective ECSY1.3: Provide a range of salinity conditions that support habitat and food production for covered fish species.

*[**Note:** conservation measures that contribute towards achieving this objective will include quantitative metric values to be developed by the Conveyance Working Group.]*

Goal ECSY 2: Increase primary and secondary production to increase the abundance and availability of food for all life stages of covered fish species.

The following ecosystem and natural community objectives that also contribute towards achieving this goal: ECSY1.3, ECSY3.2-3.3, ECSY4.1-4.5, ECSY5.2, and NACO1.1-1.5.

Objective ECSY2.1: Over the term of the BDCP, increase the abundance of zooplankton species that provide food and support food production for covered fish species in Delta waterways.

Goal ECSY 3: Reduce the adverse effects of non-native species on the Delta's aquatic ecosystem and the productivity, abundance, distribution of covered fish species.

Objective ECSY3.1: Manage the distribution and abundance of established non-native invasive species in the Delta to reduce non-native species predation on and competition with covered fish species.

Objective ECSY3.2: Manage the distribution and abundance of established non-native invasive species in the Delta to rehabilitate aquatic ecosystem processes.

Objective ECSY3.3: Minimize the likelihood for future invasions and establishment of non-native species into the Delta's aquatic ecosystem.

Goal ECSY 4: Reduce the adverse effects of contaminants on the Delta's aquatic ecosystem and the productivity, abundance, distribution of covered fish species.

Objective ECSY4.1: Contribute to managing the load of contaminants of concern that enter the Delta in wastewater treatment plant discharges to levels in conformance with existing and future water quality standards to reduce their effects on and biological uptake by covered fish species.

Objective ECSY4.2: Contribute to managing the load of contaminants of concern that enter the Delta from urban sources to levels in conformance with existing and future water quality standards to reduce their adverse effects on and biological uptake by covered fish species.

Objective ECSY4.3: Contribute to managing the load of methyl mercury entering the Delta from in-Delta and upstream sources to levels in conformance with existing and future water quality standards to reduce adverse effects of methyl mercury on and biological uptake by covered fish species.

Objective ECSY4.4 Contribute to managing the load of contaminants of concern entering the Delta from in-Delta and upstream sources from agricultural practices in conformance with existing and future water quality standards to reduce their adverse effects on and biological uptake by covered fish species.

Objective ECSY4.5: Coordinate efforts to detect and respond to toxic events in the Delta.

Goal ECSY5: Provide for the spatial distribution and connectivity of covered species habitats across the Delta to support the effective movement and genetic exchange of covered species within and among natural communities both inside and outside of the BDCP planning area.

The following ecosystem and natural community objectives also contribute towards achieving this goal: ECSY1.1-1.3 and NACO1.1-1.5.

Objective ECSY5.1: Provide the hydrodynamic and salinity and other water quality conditions within the Delta that support the effective movement of all life stages of covered fish species between spawning, larval, juvenile, and adult habitat areas.

*[**Note:** conservation measures that contribute towards achieving this objective will include quantitative metric values to be developed by the Conveyance Working Group.]*

Objective ECSY5.2: Contribute to the availability of well-distributed restored floodplain, riparian, tidal marsh, and shallow subtidal aquatic habitats to support

increased distribution of covered species and improved connectivity among covered species habitats within and adjacent to the BDCP planning area.

Covered Natural Community Goals and Objectives

Goal NACO1: Protect, enhance, and restore tidal perennial aquatic, tidal freshwater emergent, brackish freshwater emergent, floodplain, and valley riparian communities to provide habitat and ecosystem functions to increase the natural production (reproduction, growth, and survival), abundance, and distribution of covered species.

Objective NACO1.1: Increase the frequency that floodplain habitat within the Yolo Bypass is inundated for at least 45 consecutive days to approximately __ percent of years.

Objective NACO1.2: Provide for the inundation of at least __ acres of historical floodplain surfaces that have been disconnected from river channels to provide habitat and ecosystem functions that support of covered species.

Objective NACO1.3: Restore, manage, and protect at least __ acres of freshwater tidal marsh in the Delta that provides habitat and ecosystem functions in support of covered species.

Objective NACO1.4: Restore, manage, and protect __ acres of brackish tidal marsh in Suisun Marsh/Bay to provide habitat and ecosystem functions in support of covered species.

Objective NACO1.5: Restore at least __ acres of riparian forest and scrub within the Delta to provide habitat and ecological functions in support of covered species.

Covered Species Goals and Objectives

General Covered Fish Species

Goal GECF1: Increase the abundance of covered fish species by reducing sources of unnatural mortality.

Objective GECF1.1: Reduce entrainment of covered fish species at non-project diversions.

Objective GECF1.2: Reduce entrainment of covered fish species at the Banks Pumping Plant and the Jones Pumping Plant.

Objective GECF1.3: Reduce entrainment of covered fish species into the SWP and CVP north Delta diversion intakes in the BDCP long-term implementation period.

Objective GECF1.4: Contribute towards reducing the risk for dissolved oxygen sags in Delta and Suisun Marsh waterways that could result in mortality of covered fish species.

Objective GECF1.5: Minimize the adverse effects of harvest on covered fish species.

Goal GECF2: Reduce impacts of hatcheries on the genetic fitness and integrity of propogated and natural populations of covered fish species.

GECF2.1: Manage salmonid hatcheries to minimize their adverse effects on fitness of wild Chinook salmon and steelhead populations.

GECF2.2: Reduce the risk for the extinction of delta smelt and the extirpation of longfin smelt by maintaining and expanding existing artificial propagation programs for preserving the genetic diversity of delta smelt and longfin smelt populations and contributing to their abundance and distribution within the planning area.

Delta Smelt

Goal DESM1: Create conditions that support a viable population of delta smelt in the Delta and Suisun Bay.

The following ecosystem, natural community, and general covered fish species objectives that also contribute towards achieving this goal: ECSY1.1-1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECF1.1-1.4, and GECF2.2.

Objective DESM1.1: Increase the distribution of delta smelt within the Delta and Suisun Bay relative to the distribution observed from [year] to [year] based on results of Fall Midwinter Trawl (FMWT) surveys.

Objective DESM1.2: Increase the abundance of delta smelt within the Delta and Suisun Bay relative to mean abundance indices for [year] to [year] based on results of FMWT surveys.

Objective DESM1.3: Increase habitat availability for all delta smelt life stages in the Delta and Suisun Marsh/Bay.

Objective DESM1.4: Increase delta smelt stock recruitment in years of comparable hydrology relative to hydrological conditions observed from [year] to [year].

Longfin Smelt

Goal LOSM1: Create conditions that support a viable population of longfin smelt in the Delta and Suisun Bay.

The following ecosystem, natural community, and general covered fish species objectives that also contribute towards achieving this goal: ECSY1.1-1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECF1.1-1.4, and GECF2.2.

Objective LOSM1.1: Increase the distribution of longfin smelt within the Delta and Suisun Bay relative to the distribution observed from [year] to [year] based on results of Fall Midwinter Trawl (FMWT) surveys.

Objective LOSM1.2: Increase the abundance of delta smelt within the Delta and Suisun Bay relative to mean abundance indices for [year] to [year] based on results of FMWT surveys.

Objective LOSM1.3: Increase habitat availability for all longfin smelt life stages in the Delta and Suisun Marsh/Bay.

Objective LOSM1.4: Increase longfin smelt stock recruitment in years of comparable hydrology relative to hydrological conditions observed from [year] to [year].

Chinook Salmon

The following

Goal CHIN1: Increase the survival of juvenile Chinook salmon passing through the Delta.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1, ECSY1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECF1.1-1.5, and GECF2.1.

Objective CHIN1.1: Increase the survival of juvenile Sacramento Basin spring-run Chinook salmon passing through the Delta to Chipps Island in the BDCP near-term implementation period by __ percent, fall/late fall-run Chinook salmon by __ percent, and winter-run Chinook salmon by __ percent from mean survival rates observed from [year] to [year].

Objective CHIN1.2: Increase the survival of juvenile Sacramento Basin spring-run Chinook salmon passing through the Delta to Chipps Island in the BDCP long-term implementation period by __ percent, fall/late fall-run Chinook salmon by __ percent, and winter-run Chinook salmon by __ percent from mean survival rates observed from [year] to [year].

Objective CHIN1.3: Increase the survival of juvenile San Joaquin Basin fall-run Chinook salmon passing through the Delta to Chipps Island in the BDCP near-term implementation period by __ percent from mean survival rates observed from [year] to [year].

Objective CHIN1.4: Increase the survival of juvenile San Joaquin Basin fall-run Chinook salmon passing through the Delta to Chipps Island in the BDCP long-term implementation period by __ percent from mean survival rates observed from [year] to [year].

Objective CHIN1.5: When a spawning population of spring-run Chinook salmon established in the San Joaquin River, provide for survival of San Joaquin Basin spring-run Chinook salmon passing through the Delta to Chips Island in the BDCP long-term implementation period of at least __ percent.

Goal CHIN2: Increase the growth of juvenile Chinook salmon that pass through and rear in the Delta to increase the likelihood for survival of juvenile Chinook salmon in San Francisco Bay and ocean habitats.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.3, ECSY2.1, ECSY3.2-3.3, ECSY4.1-4.5, ECSY5.2, and NACO1.1-1.5.

Objective CHIN2.1: Increase the mean weight and length of juvenile Sacramento Basin spring-run Chinook salmon, fall/late fall-run Chinook salmon, and winter-run Chinook salmon passing through the Delta to Chipps Island.

Objective CHIN2.2: Increase the mean weight and length of juvenile San Joaquin Basin fall-run Chinook salmon passing through the Delta to Chipps Island.

Goal CHIN3: Maintain or increase life history diversity of all runs of Chinook salmon.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1-1.3 and ECSY5.1.

Objective CHIN3.1: Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for all runs of Chinook salmon over time.

Goal CHIN4: Increase the proportion of all runs of adult Chinook salmon that successfully migrate upstream through the Delta to upstream spawning habitats.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECF1.4, GECF1.5, and GECF2.1.

Objective CHIN4.1: Provide flow conditions that minimize occurrences of false attraction of all runs of adult Chinook salmon into non-natal basins.

Objective CHIN4.2: Increase the passage of all runs of Sacramento Basin adult Chinook salmon past the Fremont Weir into the Sacramento River by __ percent from the passage efficiency provided by the existing Fremont Weir fish ladder.

Objective CHIN4.3: Increase the passage of all runs of San Joaquin Basin adult Chinook salmon past the Stockton Deep Water Ship Channel by contributing towards maintaining dissolved oxygen levels of at least 5 ppm within the Stockton Deep Water Ship Channel during periods Chinook salmon are present.

Central Valley Steelhead

Goal STEE1: Increase the survival of juvenile steelhead passing through the Delta.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1, ECSY1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECF1.1-1.5, and GECF2.1.

Objective STEE1.1: Increase the survival of juvenile Sacramento Basin steelhead passing through the Delta to Chipps Island in the BDCP near-term implementation period by __ percent from mean survival rates observed from [year] to [year].

Objective STEE1.2: Increase the survival of juvenile Sacramento Basin steelhead passing through the Delta to Chipps Island in the BDCP long-term implementation period by __ percent from mean survival rates observed from [year] to [year].

Objective STEE1.3: Increase the survival of juvenile San Joaquin Basin steelhead passing through the Delta to Chipps Island in the BDCP near-term

implementation period by __ percent from mean survival rates observed from [year] to [year].

Objective STEE1.4: Increase the survival of juvenile San Joaquin Basin steelhead passing through the Delta to Chipps Island in the BDCP long-term implementation period by __ percent from mean survival rates observed from [year] to [year].

Goal STEE2: Increase the growth of juvenile steelhead that pass through and rear in the Delta to increase the likelihood for survival of juvenile steelhead in San Francisco Bay and ocean habitats.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.3, ECSY2.1, ECSY3.2-3.3, ECSY4.1-4.5, ECSY5.2, and NACO1.1-1.5.

Objective STEE2.1: Increase the mean weight and length of juvenile Sacramento Basin steelhead passing through the Delta to Chipps Island.

Objective STEE2.2: Increase the mean weight and length of juvenile San Joaquin Basin steelhead passing through the Delta to Chipps Island.

Goal STEE3: Maintain or increase life history diversity of Central Valley steelhead.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1-1.3 and ECSY5.1.

Objective STEE3.1: Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for Central Valley steelhead over time.

Goal STEE4: Increase the proportion of adult Central Valley steelhead that successfully migrate upstream through the Delta to upstream spawning habitats.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECF1.4, GECF1.5, and GECF2.1.

Objective STEE4.1: Provide flow conditions that minimize occurrences of false attraction of all runs of steelhead into non-natal basins.

Objective STEE4.2: Increase the passage of steelhead past the Fremont Weir into the Sacramento River by __ percent from the passage efficiency provided by the existing Fremont Weir fish ladder.

Objective STEE4.3: Increase the passage of San Joaquin Basin adult steelhead past the Stockton Deep Water Ship Channel by contributing towards maintaining dissolved oxygen levels of at least 5 ppm within the Stockton Deep Water Ship Channel during periods steelhead are present.

Sacramento Splittail

Goal SASP1: Maintain and conserve the viable population of Sacramento splittail in the Delta.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1, ECSY1.3, ECSY2.1, ECSY3.1-3.4, ECSY4.1-4.4, ECSY5.1-5.2, , NACO1.1-1.5, GECF1.1-1.5.

Objective SASP1.1: Maintain or improve the distribution of Sacramento splittail within the Delta and Suisun Bay relative to the distribution observed from [year] to [year] based on results of Fall Midwinter Trawl (FMWT) surveys.

Objective SASP 1.2: Increase the abundance of Sacramento splittail within the Delta and Suisun Bay relative to mean abundance indices for [year] to [year] based on results of FMWT surveys.

Objective SASP1.3: Provide increased spatial availability of Sacramento splittail spawning habitats.

Objective SASP1.4: Maintain multiple spawning cohorts of Sacramento splittail as part of the breeding population.

Green Sturgeon

Goal GRST1: Increase the proportion of green sturgeon that successfully migrate upstream through the Delta to upstream spawning habitats.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECF1.4, and GECF1.5.

Objective GRST1.1: Provide flow conditions that minimize occurrences of false attraction of adult green sturgeon into non-natal basins.

Objective GRST1.2: Increase the passage of adult green sturgeon past the Fremont Weir into the Sacramento River by __ percent from the passage efficiency provided by the existing Fremont Weir fish ladder.

Objective GRST1.3: Provide for the potential reestablishment of green sturgeon in the San Joaquin River by contributing towards maintaining dissolved oxygen levels of at least 5 ppm within the Stockton Deep Water Ship Channel during periods adult green sturgeon are migrating to spawning habitats.

Goal GRST2: Increase juvenile green sturgeon habitat availability.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.3, ECSY5.1, and NACO1.1-1.4.

Objective GRST 1.1: Increase the spatial distribution of juvenile green sturgeon within the Delta.

Goal GRST3: Maintain or increase life history diversity of green sturgeon.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1-1.3 and ECSY5.1.

Objective GRST3.1: Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for green sturgeon over time.

White Sturgeon

Goal WHST1: Increase the proportion of white sturgeon that successfully migrate upstream through the Delta to upstream spawning habitats.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECF1.4, and GECF1.5.

Objective WHST1.1: Provide flow conditions that minimize occurrences of false attraction of white sturgeon into non-natal basins.

Objective WHST1.2: Increase the passage of white sturgeon past the Fremont Weir into the Sacramento River by __ percent from the passage efficiency provided by the existing Fremont Weir fish ladder.

Objective WTST1.3: Increase the passage of white sturgeon past the Stockton Deep Water Ship Channel by contributing towards maintaining dissolved oxygen levels of at least 5 ppm within the Stockton Deep Water Ship Channel during periods white sturgeon are present.

Goal WHST2: Increase juvenile white sturgeon habitat availability.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.3, ECSY5.1, and NACO1.1-1.4.

> **Objective WHST 2.1:** Increase the spatial distribution of white sturgeon within the Delta.

Goal WHST3: Maintain or increase life history diversity of white sturgeon.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1-1.3 and ECSY5.1.

> **Objective WHST3.1:** Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for white sturgeon.

Terrestrial Covered Species

[To come.]